Realize an Autonomous SAN with Brocade Gen 7 Fibre Channel

September 2020

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Businesses Require More From Their Infrastructure

>70% of enterprise storage arrays are all-flash

Analytics will enable non-stop data centers

IT needs to be simpler to manage

NVMe is becoming mainstream for storage in 2020

Infrastructures need to be more agile with automation

Source: Gartner Q2'19 YTD Storage Market Share, by revenue

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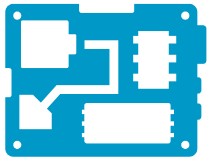
New Technologies Accelerate the Delivery of Data and Services

The SAN needs to evolve to keep pace with innovations and modern day demands

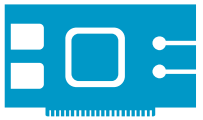
Critical Applications

ORACLE | SAP | ca technologies A Broadcom Company | Symantec A Division of Broadcom | Microsoft SQL Server | vmware | CITRIX | Microsoft Hyper-V

Next-Gen Servers (2020-2021)



Intel, Whitley
AMD, Milan



PCIe 4

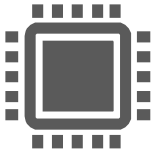
Drastically improves server performance and doubles IO in the same footprint

Storage Area Network

?

Enterprise Storage

All Flash



NVMe

SCM

Insanely fast storage with parallel, low-latency data paths

What About the SAN?

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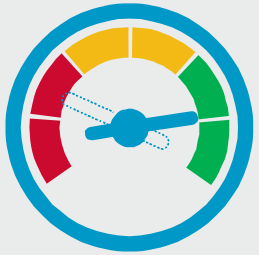
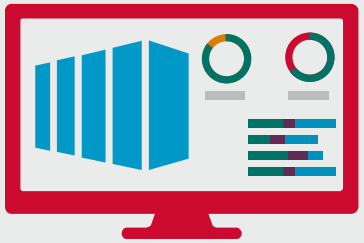
Requirements for the On-Demand Data Center



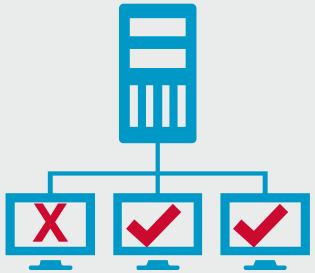
Drive New Levels of Performance



Monitor Application Performance

Identify Network Congestion

Prioritize Types of Traffic



Isolate Configuration Errors

Identify Misbehaving Devices

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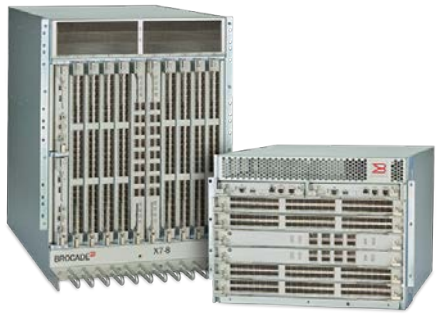
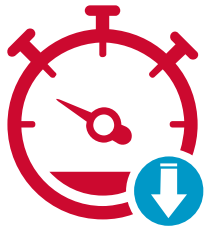
Gen 7 Fibre Channel Enables the Autonomous SAN



Brocade GEN7 FIBRE CHANNEL

Brocade Gen 7 Delivers A Faster, More Intelligent, More Resilient Network

Faster



Maximize NVMe and high-transaction workloads with 50% lower latency compared to Gen 6

Scalable

Scale more devices, applications and workloads with double the performance through 64Gb/s links

Intelligent

Transform data into actionable insights to optimize performance and ensure reliability with built-in analytics

Resilient

Automate actions to simplify management and resolve issues without intervention with automation

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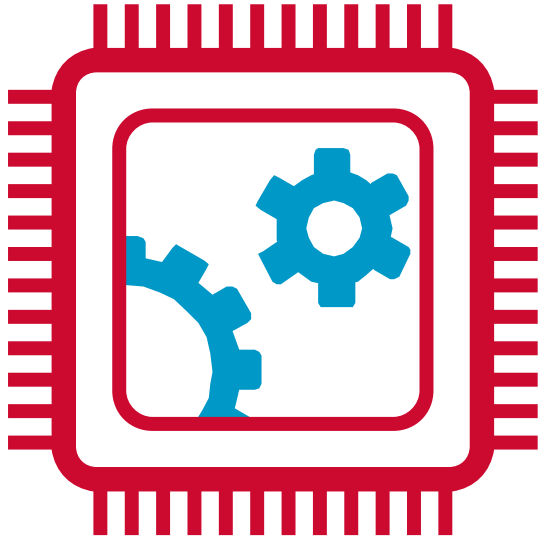
Brocade Gen 7 Overview

The Industry's Most Advanced Switching ASIC

Fibre Channel platforms built on Condor 5 ASIC

- 50% lower latency for NVMe workloads (460ns latency)
- Ability to learn, measure and monitor fabric wide latency of flows
- 50% more buffers per ASIC to support distance, burst workloads and congestion management
- 4*, 8, 10, 16, 32, 64Gb/s Fibre Channel
- Double encryption and compression capacity



* FC32-X7-48 port blade support

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Build a Foundation for the Autonomous SAN with the Brocade X7 Director

Modular design provides scale on-demand

Brocade GEN7 FIBRE CHANNEL

Two Director Models

Purpose-built to power large-scale storage environments

Brocade X7-8 Director for Large Enterprise

- 14U, eight vertical blade slots
- Scale up to 384 x 64Gb/s ports or 512 x 32Gb/s ports
- 32 additional Gen 7 UltraScale ICL ports
- Up to 31Tb/s of aggregate chassis bandwidth

Brocade X7-4 Director for Midsize Enterprise

- 9U with exhaust shelf, four horizontal blade slots
- Scale up to 192 x 64Gb/s ports or 256 x 32Gb/s ports
- 16 additional Gen 7 UltraScale ICL ports
- Up to 15.5Tb/s aggregate chassis bandwidth

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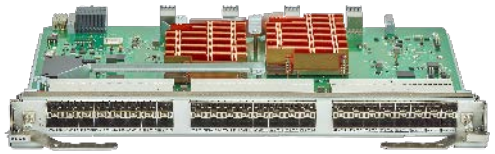
Brocade X7 Provides Flexibility

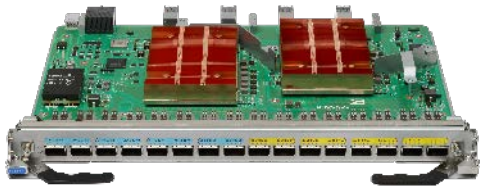
Mix and match Gen 6 and Gen 7 blades in a single chassis

- 48-port Gen 7 Brocade FC64-48 port blade with 64Gb/s line rate performance
  - Support for 8, 10, 16, 32, 64Gb/s Fibre Channel
- 48-port Gen 6 Brocade FC32-X7-48 port blade with 32Gb/s line rate performance
  - Support for 4, 8, 10, 16, 32Gb/s Fibre Channel
  - Added value over FC32-48 (reduced latency, congestion avoidance and Traffic Optimizer)
  - Non-upgradeable to 64Gb/s speeds
- Existing Gen 6 blades
  - Brocade FC32-64 high-density port blade (increase scalability and maximize space utilization)
  - Brocade SX6 Extension blade (support disaster recovery solutions over long distances)

FC64-48 port blade



FC32-X7-48 port blade



FC32-64 port blade

SX6 Extension blade

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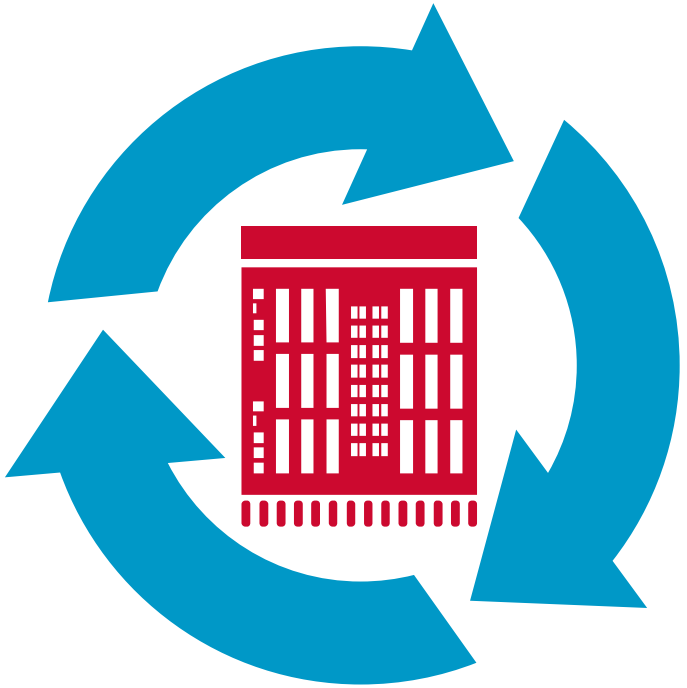
Investment Protection: X6 Director Simple Upgrade to Gen 7

- Leverage existing chassis and components
- Software upgrade to FOS v9.0 or later, including an FPGA firmware upgrade on the core processor blade
- Replace both core routing blades with new Gen 7 core routing blades
- Simply add Gen 7 port blades within the chassis or continue to use existing Gen 6 blades*



* Existing FC32-48, FC32-64. SX6 port blade are support

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Scale Out the Autonomous SAN with the Brocade G720 Switch

Built to maximize performance and simplify daily tasks

Brocade GEN7 FIBRE CHANNEL

Brocade G720 Switch

Fixed-port building block, designed to scale-out storage environments

- Efficient 1U switch that delivers high port density and space utilization
- Scales from 24 to 56 x 64Gb/s ports
  - 8 port increments on demand
- All optional software licenses included
  - Fabric Vision, ISL Trunking, Integrated Routing, FICON CUP, Extended Fabrics
- Simplifies deployment, configuration and management of SAN resources with a collection of easy-to-use tools
  - Reduces the number of steps to deploy and configure a switch with EZSwitchSetup
  - Easier to manage with Brocade Web Tools simplified user interface

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Brocade Gen 6 and Gen 7 Fibre Channel Switch Family

Brocade GEN6 FIBRE CHANNEL

Brocade G610 Switch

- 1U, 8 to 24 32Gb/s ports
- Enterprise bundle or individual features licensed separately

Brocade GEN6 FIBRE CHANNEL

Brocade G620 Switch

- 1U, 24 to 64 32Gb/s ports
- Enterprise bundle or individual features licensed separately

Brocade GEN6 FIBRE CHANNEL

Brocade G630 Switch

- 2U, 48 to 128 32Gb/s ports
- Enterprise bundle or individual features licensed separately

Brocade GEN7 FIBRE CHANNEL

Brocade G720 Switch

- 1U, 24 to 56 64Gb/s ports
- 2x performance
- 50% lower latency
- All optional software licenses included

Performance and Functionality

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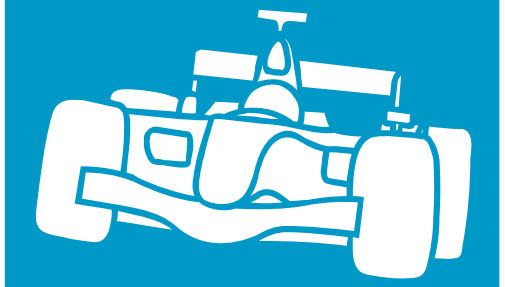
Brocade FOS 9.0 Overview

Brocade Fabric Operating System 9.0



2X

Performance

With Gen 7 Fibre Channel

New

Traffic Optimizer

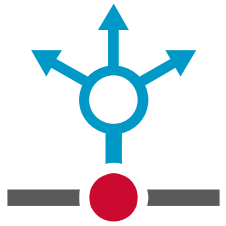
Optimize traffic performance across the network

New

Fabric Notification

Hardware and software signaling to end devices

New



Multipathing

Monitor and notify MPIO layer of link health

Better

SAN Telemetry Data

190+ more IO, NVMe and flow metrics*

Better

Flow Learning

Automatically learn and monitor application traffic path*

Better

Security

Tamper proof hardware

*Some SAN Telemetry and Flow features plan to be available in future FOS v9.0 releases

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Summary of Features and Enhancements for FOS 9.0

Autonomous

- Fabric Congestion Notification
- Gen 7 Traffic Optimizer

Analytics

- Gen 6 IO Insight Flow Learning
- Gen 6 Flow data streaming to SANnav

Automation

- REST authentication token
- User defined RBAC role
- New feature support

Management & Infrastructure

- New Java-less WebTools
- Gen 7 Unified 10-bit addressing mode
- Fabric Zoning Lock
- 4MB zoning database size
- Kernel and open source software upgrade
- Firmware update mode
- Parallel SupportSave capture
- Generic USB drive support
- Command reset to factory default
- EULA acceptance
- Mandatory FICON Logical Switch

Monitoring

- MAPS Global Quiet Time
- MAPS pause monitoring of entire switch
- MAPS System temperature monitoring
- FPI oversubscription port monitoring and alerting
- User configurable FPI thresholds
- FPI alert message indicating congested VC
- IF-Alias Object MIB support for port name
- Increase SNMP users to 12

Security

- Gen 7 Secure Boot
- OpenSSL library upgrade with TLS 1.3
- Default maintenance account
- FC-SP compliant device port authentication
- Mandatory default password change
- Gen 7 Secure license certificate
- Counterfeit license protection enhancement
- Disable default SNMP users
- Login idle session timeout
- Windows 2016 Active Directory

Brocade Gen 6 and Gen 7 Director, Switch, Extension, and Embedded Platforms

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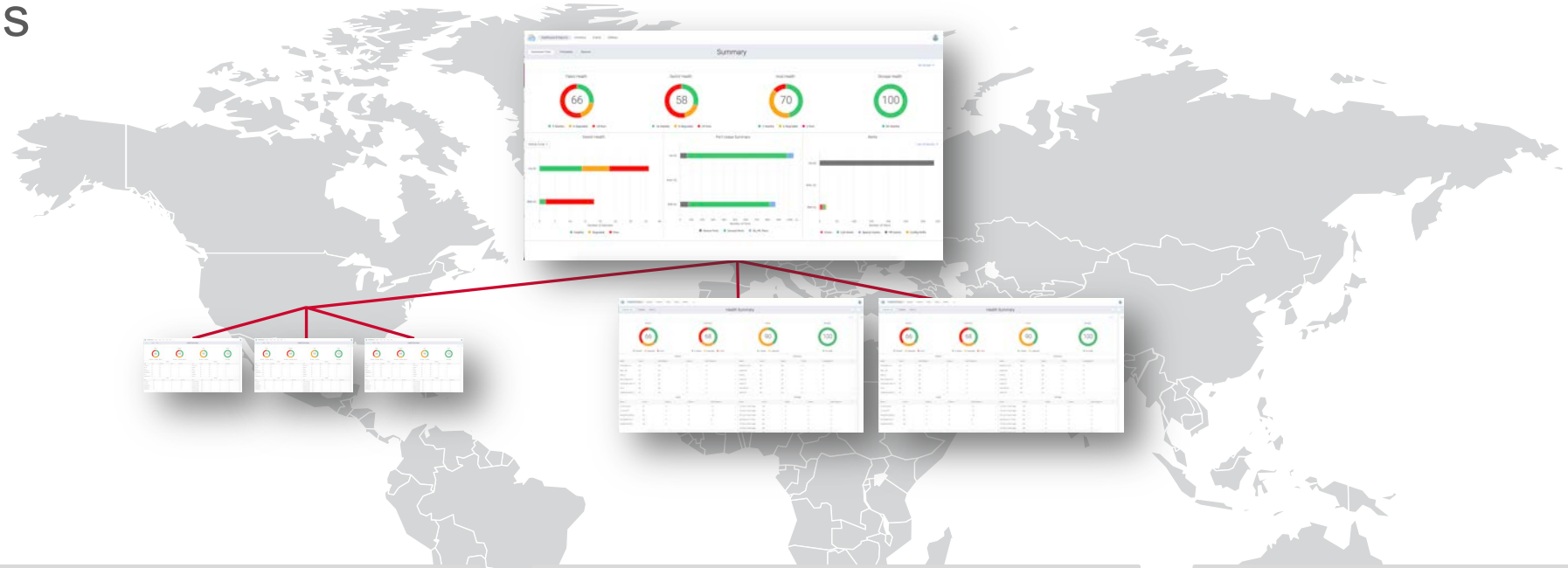
Brocade SANnav Management Portal and Global View

Modernize SAN Management

Empower IT through comprehensive visibility, actionable information and simplified processes



Visualize Your SAN

Enable comprehensive SAN visibility to provide operational clarity

Optimize Your SAN

Transform SAN behavior and performance data into actionable insights

Realize the Autonomous SAN

Accelerate and reduce administrative tasks by automating processes

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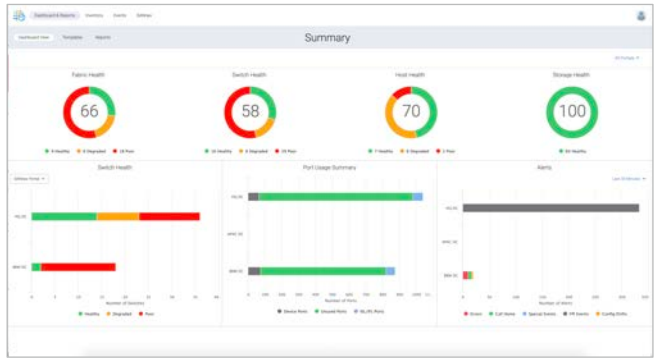
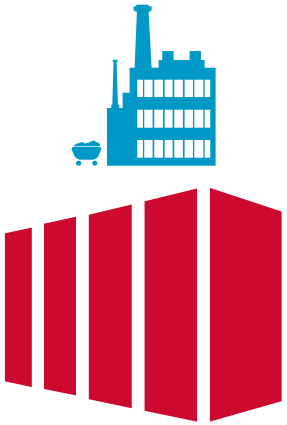
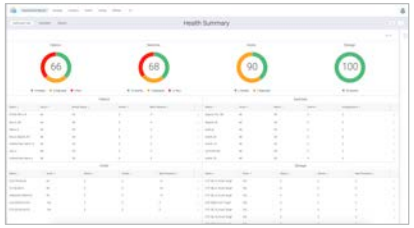
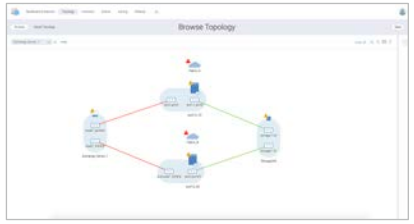
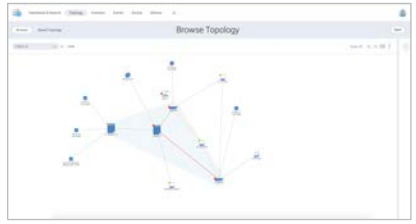
Brocade SANnav Management Portal and Global View











SANnav Global View

Quickly visualize the health, performance, and inventory of all the fabrics across all SANnav Management Portals using a simple, intelligent dashboard

SANnav Management Portal

Next-generation SAN management application, architected from the ground up with a focus on streamlining common workflows, such as configuration, zoning, deployment, and troubleshooting.

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SANnav 2.1 Added Features

Inventory & Visualization

- New Topology and Inventory features and enhancements
- New End Device OUI Mapping
- New Automatic Storage Mapping
- New FOS v9.0.0 Web Tools launch with SSO
- New CLI scripting
- Gen 6 Flow Support

Configuration & Operations

- New Zoning Features
- New Configuration Policy Management features
- New Flow Collection Management features
- FOS EULA acceptance

Monitoring

- New and redesigned Network Traffic Port Condition Dashboard
- New Health Summary Dashboard features
- Investigate from Events View
- New Events and MAPS Violations Filters
- New Dashboard Widgets

Troubleshooting

- Show MAPS Violations in Investigation view
- Investigate Extension up 5 second granularity
- Investigate any port at 2s granularity for last 2 hours
- Host/Storage Investigation
- Idle Device Investigation
- Flow & Collection Investigation

Usability

- Throughout the UI
- Enhanced Reporting

Infrastructure

- OVA Support
- IPv6/IPv4 Dual Stack

Automation

- Northbound Streaming
- New REST Interfaces

Serviceability

- Server Console
- Feature Usage Analysis

SANnav v2.1.0 continues to simplify SAN Management with improved visibility, providing actionable insights and automating processes

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Realize an Autonomous SAN

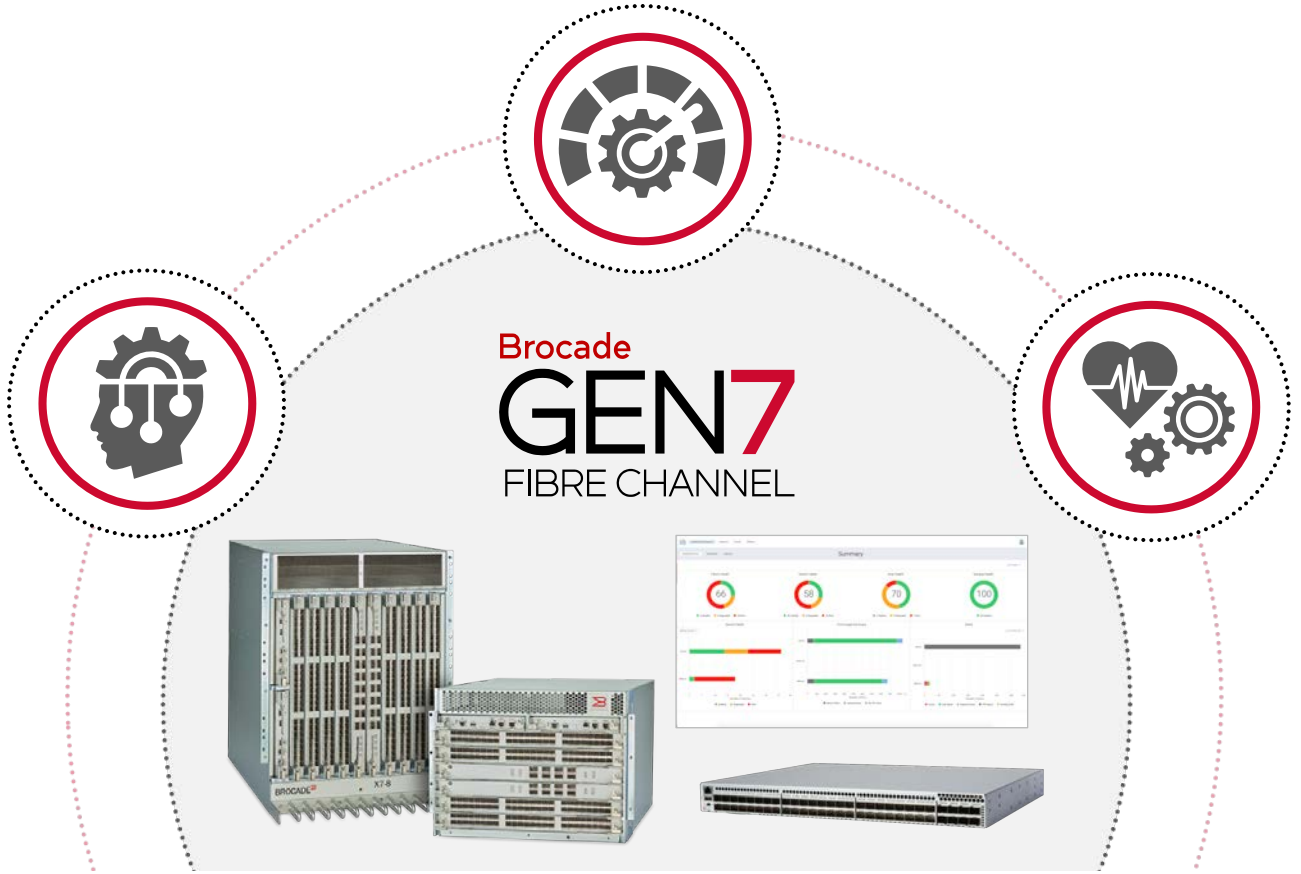
Realize an Autonomous SAN with Gen 7 Fibre Channel

Self-Optimizing

Optimize performance with automatic behavior-based actions

Self-Learning

Instantly understand your SAN with actionable insights



Self-Healing

Ensure reliability with automatic avoidance and recovery features

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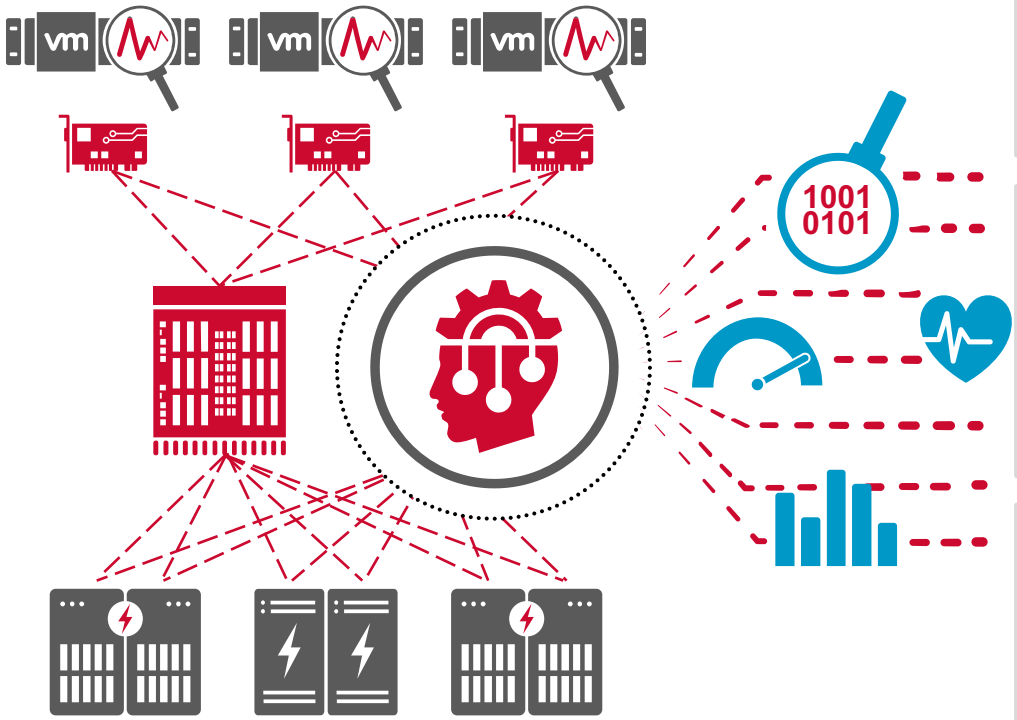
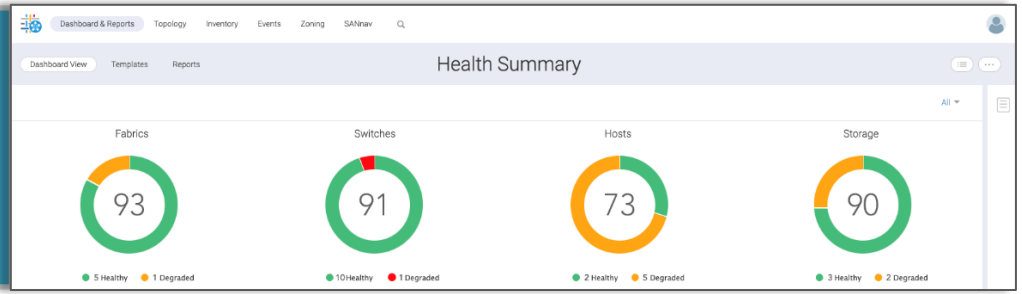
Self-Learning Transforms Data into Actionable Intelligence

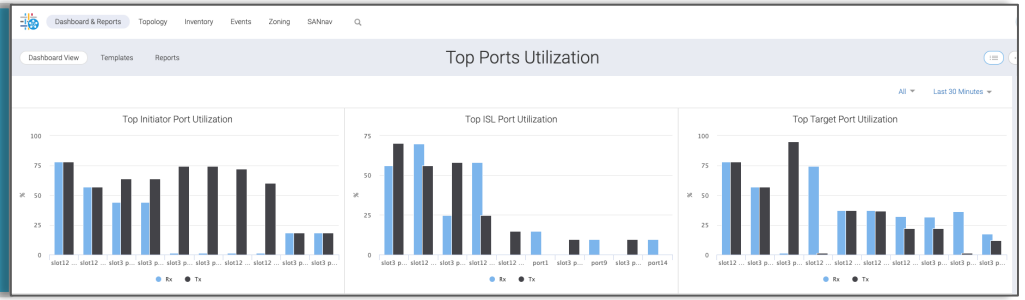


Quickly understand the impact of current or trending problems

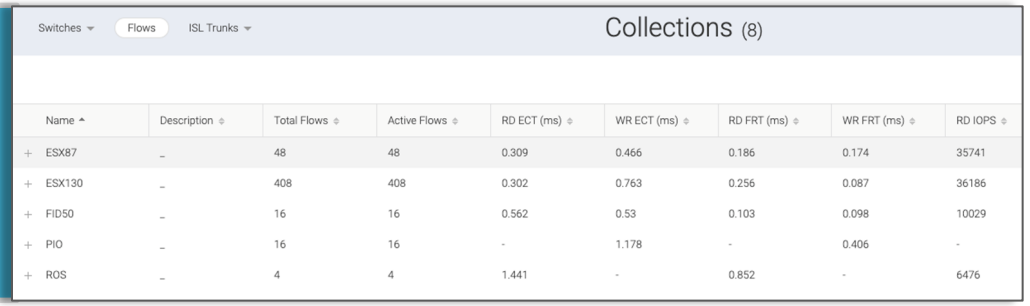
Instantly correlates data into health scores



Summarizes critical data into easy to read dashboards



Learn how application traffic flows through the network



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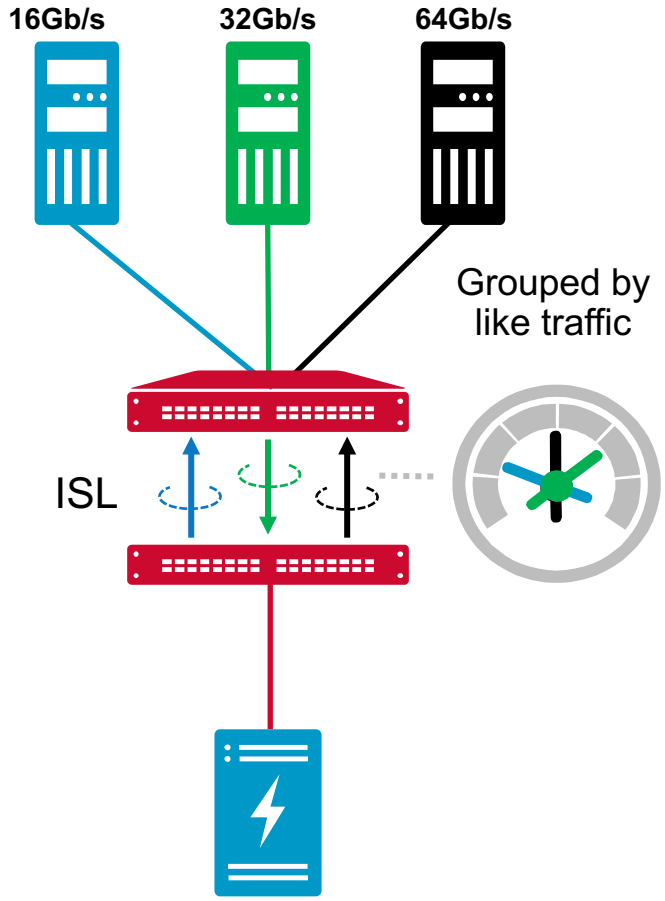
Self-Optimizing Maximizes Performance Based on Learned Behavior

Traffic Optimizer automatically isolates traffic by speed to optimize performance

- Mixing workloads can cause slow downs and congestion
- Eliminate common oversubscription and congestion issues caused by mismatched speed
- Optimize and guarantee application performance by prioritizing and grouping traffic based on like characteristics



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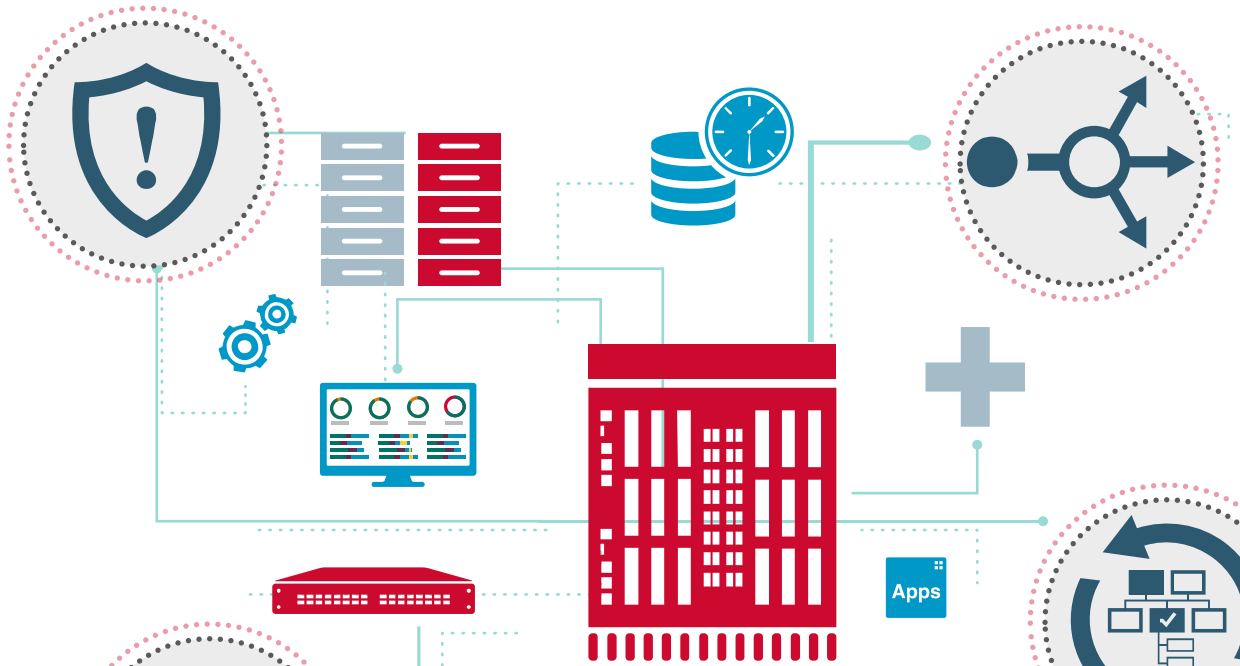
Self-Healing Mitigates and Resolves Issues Without Intervention

Automatic Avoidance and Recovery Features Ensure Reliability



Instant notification of congestion

Automatic failover when issues occur

Detect and reconfigure out-of-compliance fabrics

Automatically take corrective action on misbehaving devices

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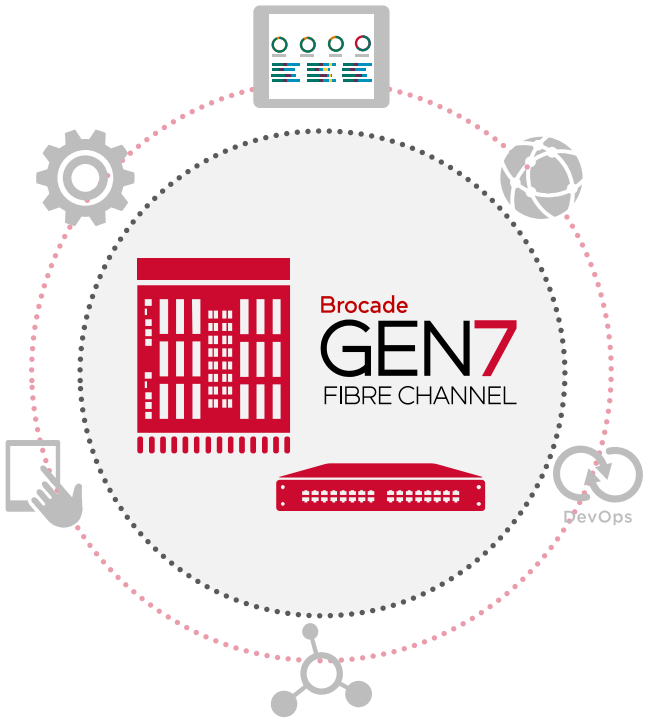
NVMe Over Fibre Channel

Purpose-Built for NVMe Storage

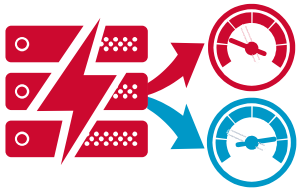


Performance

Enable significant performance gains for flash with low latency, NVMe-ready Fibre Channel

Seamless Integration

Deploy NVMe over Fibre Channel with no rip-and-replace



Concurrent Traffic

Run NVMe and SCSI concurrently on same network for gradual technology migration

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NVMe over Fibre Channel x86 OS Support

Industry support for NVMe over Fibre Channel

- SLES12 SP4 In-Box and newer

- RHEL 7.6 In-Box and newer

- Windows 2012R2 and newer
- Logo Certified: Completed Oct 2017
- Inbox with 2019

- ESXi 7.0 In-box and newer

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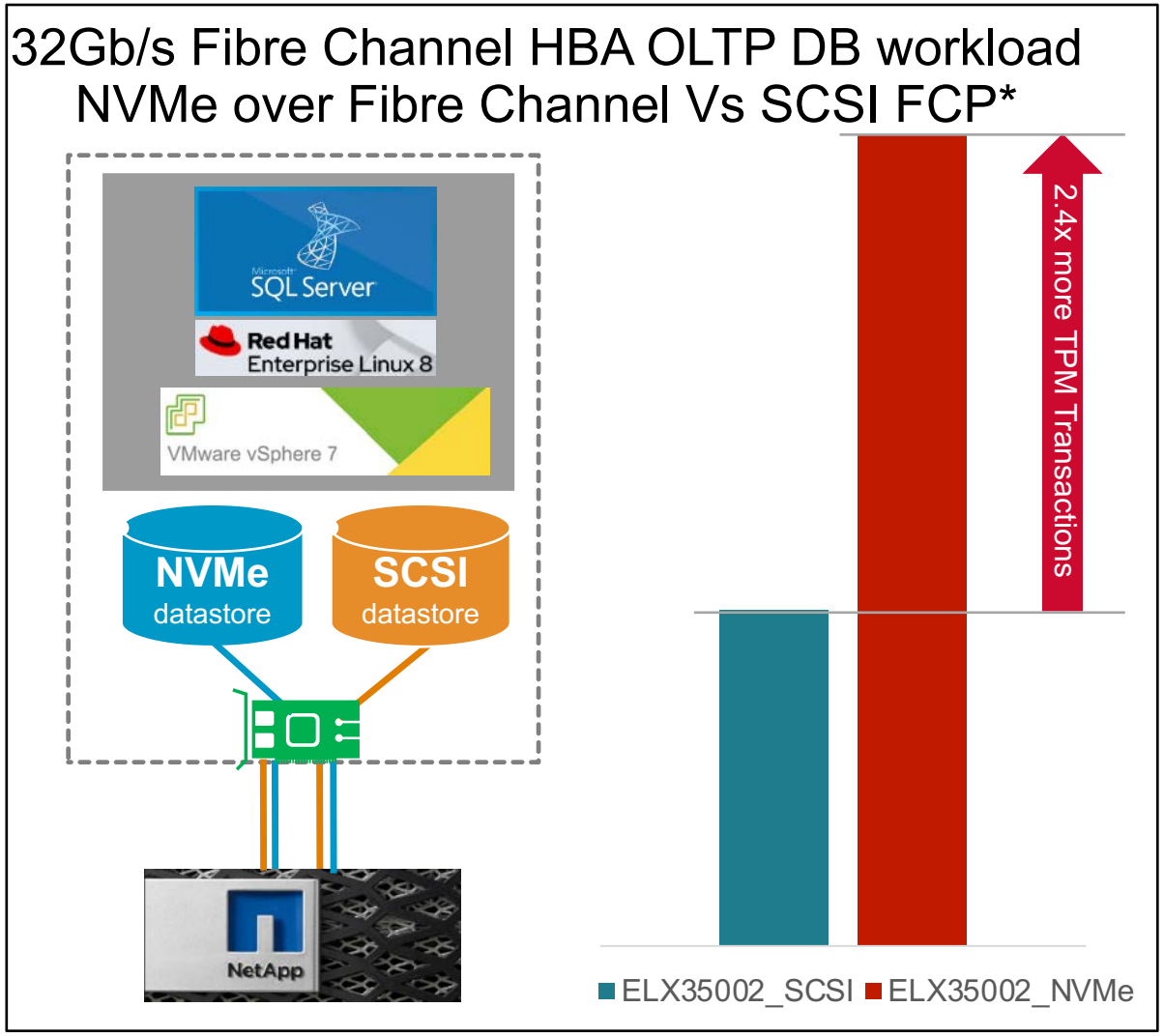
VMware vSphere 7 NVMe over Fibre Channel Solution

Increased performance for virtualized enterprise applications

- NVMe over Fibre Channel delivers a performance boost for database workloads when compared to SCSI FCP
  - Improves **Microsoft SQL Server 2019** performance by up to **2.4x**
  - Improves **Oracle Database 19c** performance by up to **2.1x**
- Enables customers to take advantage of next generation storage with ESX, while maintaining the benefits of their Fibre Channel Networks
- Concurrent NVMe over Fibre Channel and SCSI FCP on the same port
- Emulex is the only inbox driver for NVMe over Fibre Channel
- NetApp Blog *Now THAT's a QUICK Database*



* Tolly Test report, document 220117, Microsoft SQL Server 2017/ Oracle 19c, RHEL 8 VM, NVMe/FC, NetApp AFF A800, HammerDB TPC-C Profile, TPM - Transactions per minute. 1:10 mem/dataset ratio. Direct/Async IO

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Summary – Gen 7 Fibre Channel Enables the Autonomous SAN

Brocade GEN7 FIBRE CHANNEL

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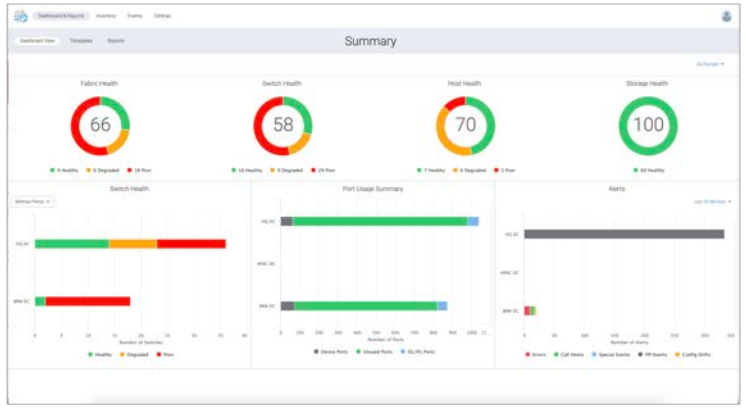

SANnav Management Portal

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AUTONOMOUS SAN

Maximize the Value of Next-Gen Data Centers

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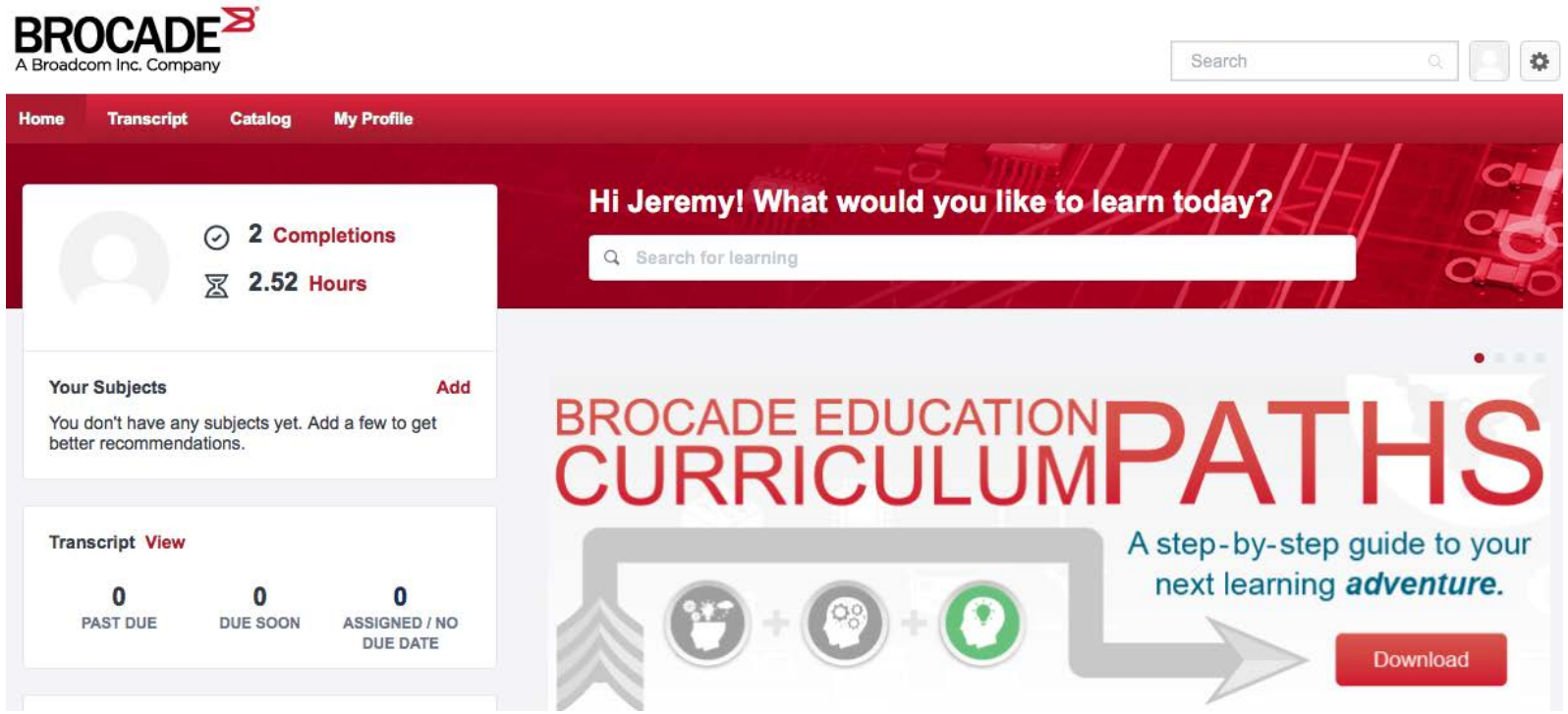
Brocade Education

Advance Your Skills With Free On-Demand Brocade SAN Training

Self-paced online training, available 24/7

- Comprehensive variety of free on-demand courses for Brocade SAN products and Fibre Channel technologies
- Follow a predefined training path or pick individual courses from our catalog at no cost to you
- Build up your skills needed to install, configure, administrate and maintain SAN environments



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Brocade Education Courses

PRODUCT TRAINING

- Introduction to Brocade Gen 7 Director Hardware (HWG7D-120)
- Introduction to Brocade Gen 7 Switch Hardware (HWG7S-120)

PRODUCT UPDATE TRAINING

- Gen 7 Switch and Director Product Update Training (PUT-234)
- Fabric OS V9.0 Product Update (PUT-235)
- SANnav v2.1.0 Product Update (PUT-236)

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Alert …. Upcoming Brocade Webinars

Webinar #2
The Power Source: Brocade Fabric OS 9 SANnav 2.1
date: **Wednesday, Sep 30** time: **4pm CET – 3pm GMT**
Presenters: **Michael Klein -** *Head of Principal Systems Engineering* **Salim Galou –** *Product Manager, BSN Software*

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Thank You


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